AQUACULTURE WORKING GROUP

Responses to NOSB Livestock Committee

On September 8, 2006, the NOSB Livestock Committee released an *Invitation for Public Comment on Aquaculture Standards.* Responses by the Aquaculture Working Group (AWG) to the several questions are below.

Species or Production Method Specific Standards

The Livestock Committee invites input relative to identification of and justification for the production systems or categories of species that should be considered separately.

Further, the committee invites input on the identification of the specific sections of the Aquaculture Working Group Interim Final Report that may require species or production method specific standards.

It has been suggested that the proposed standards by AWG need to be more specific for the different species and growing systems. In preparing the proposed standards, AWG was aware that the existing standards in the Final Rule for livestock and crops, in most cases, are not species specific. There is little differentiation in livestock standards with limited differentiation for poultry, dairy, and others. Under poultry there is no differentiation between turkeys, ducks, broilers, and laying hens. AWG followed this undifferentiated format in drafting proposed aquaculture standards. The only exception concerns bivalve molluscs, where separate additional proposed standards are being developed.

AWG understands that it is the intention of NOSB and the National Organic Program to amend the Final Rule to develop for greater specificity throughout. In addressing aquaculture, it would appear that the most likely need would be for species specificity relative to stocking densities. At the present time, it is impossible to establish rational density standards since the link between density and fish welfare is not well established. Many considerations would be involved in this determination including factors affecting health, growth, welfare, site characteristics, production methods, and others. In nature some species of fish cluster together in high-density schools while others are solitary.

In some foreign organic standards, stocking densities established for some species are arbitrary. For example, one standard allows a density of 10 kg/m^3 for salmon in net pens while the same standard allows a density of 20 kg/m^3 for trout, which is also a salmonid. In both species, fish size and water flow rate determines optimum stocking densities. Water flow and exchange rates vary widely from farm to farm. Fish size also determines optimum stocking densities in both species. AWG has sought to develop organic aquaculture standards based upon good science that are consistent with established organic principles and opposes arbitrary standards.

Most existing organic standards propose stocking densities that are lower than practiced in conventional culture. The implicit assumption is that lower densities are associated with improved fish welfare. In some cases specifying low stocking densities

would be counterproductive. For example in a recent scientific publication[1] it was found that "low as well as high stocking densities have the potential to adversely affect trout welfare." With some species, reducing stocking density increases the frequency of agonistic encounters because low density allows the development of social hierarchies. Increased agonistic encounters among cultured fish increases stress and reduces fish welfare. Commercially relevant stocking densities lead to the breakdown of social hierarchies and reduced stress (and presumably increased welfare) in cultured animals.

The AWG proposes that the establishment of species-specific standards for stocking densities and other factors await the development of good science. Advancements are being made in some areas and AWG would rather base stocking densities upon good science and not follow what appear to be arbitrary standards used in some other jurisdictions.

The AWG also opposes the development of production system-specific standards. Many different species can be cultured in many different ways. Channel catfish can be cultured in earthen ponds, raceways, and net pens. Tilapia can be cultured in earthen ponds, warmwater raceways, freshwater net pens, and recirculating systems. Salmonids can be cultured in net pens and raceways. A net pen standard would thus have to consider warmwater and coldwater species and freshwater and marine environments, each difference requiring specific standards. Similar to the objections raised with respect to species-specific standards, rational production system-specific standards would be difficult to formulate given the diversity of species cultured in a specific culture system.

Impact on the Environment

The Livestock Committee invites input from the organic community, consumers, aquaculture professionals, environmentalists and other interested parties as to how organic aquaculture will meet the requirement of maintaining or improving the environment, including the use of integrated net pen systems as proposed in the Aquaculture Working Group Interim Final Report.

The Livestock Committee indicates that organic aquaculture must maintain or improve the environment. This is based on foundational principles of organic agriculture, which focuses on the role of soil and that organic agriculture should endeavor to build soil tilth and fertility. The role of soil in aquaculture production systems is very different from its role in terrestrial agriculture. In aquaculture, soil assumes variable importance, with a greater role in pond systems and no role in recirculating systems.

The appropriate analogous pairs are soil is to agriculture as water is to aquaculture. Therefore, the question becomes how does organic aquaculture maintain or improve water quality? There are two aspects to the answer to this question. First, all aquaculture production systems can be viewed as having a negative impact on water quality. In most cases, nutrients and organic matter are added to water of very high quality, leading to varying degrees of eutrophication. However, natural ecosystems have an inherent capacity to assimilate waste nutrients and organic matter without leading to ecosystem degradation. In some cases ecosystem are improved by additions of nutrients. The proposed

[1] North, B.P., J.F. Turnbull, T. Ellis, M.J. Porter, H. Migaud, J Bron, N.R. Bromage 2006, The impact of stocking density on the welfare of rainbow trout (*Oncorhynchus mykiss)*. Aquaculture 255 (2006) 466-479.

standards explicitly recognize this assimilative capacity, difficult as it may be to define specifically. Second, the idea of maintaining or improving the environment is ultimately a value-based judgment. Many people value pristine water quality, but the case can be made that increased fertility results in water that is more productive from the standpoint of fish production, something that also may be valued by certain segments of society.

Aquaculture production systems, particularly ponds, are embedded in a matrix of terrestrial ecosystems. As such, aquaculture (conventional and organic) can increase habitat diversity by increasing the surface area of wetlands. Given the tremendous loss of wetlands in the United States, aquaculture ponds increase the availability of wetland habitat for migrating waterfowl. Aquaculture ponds are also ecotone or edge habitats between much larger terrestrial ecosystems and aquatic ecosystems. Thus, construction of aquaculture ponds can improve overall landscape quality by increasing habitat diversity.

Net pen production systems are seen as problematic by some environmental organizations. However, net pens can improve the environment in several ways. By increasing the diversity of underwater structure, net pens serve as aggregating devices and artificial reefs for fish, invertebrates and other wildlife, thereby improving the overall productivity of the habitat. If managed to not exceed local carrying capacity, net pen operations increase species diversity and productivity of the benthic ecosystem underneath them. In addition because net pen systems preclude access to benthic environments by commercial fishing, they establish refuges for both commercial and noncommercial species. With respect to the specific integrated net pen system proposed by the AWG, the system provides an area of locally high biodiversity while simultaneously maintaining high productivity with a number of cultured species, exploiting synergies among the species in the polyculture

The proposed standards of organic aquaculture contain multiple requirements that the farmer preserve and protect biodiversity, functional integrity, and quality of surrounding aquatic and terrestrial ecosystems. These requirements include specific components of the Organic Farm Plan that require farmers to demonstrate how they are achieving these goals. The requirement to demonstrate how <u>on</u>-farm practices are preserving and protecting <u>off</u> farm biodiversity, ecosystem integrity and quality is unprecedented. Conventional aquaculture operations are not required to do this.

Differences between Organic and Conventional Aquaculture.

Comments from organic consumers and other stakeholders on their expectations and explanations of the differences between organic aquaculture and conventional aquaculture methods and products are invited.

The AWG Interim Final Report and amendments under consideration for the proposed standards provide substantial differentiation from conventional aquaculture production in a number of critical areas:

> <u>Feed.</u> During the first seven years, fish meal and oil from wild harvest, in combination, can total a maximum of 24% of aquaculture feed. All other ingredients must be certified organic. Fish meal and oil can be obtained and used under very different conditions including sourcing of wild fish and a mandated reduction of contaminants. At present there are no conventional sources of fish meal and oil that meet

the proposed specifications, requiring that new sources be developed to satisfy the proposed standard. In addition to mandated reduced oil-soluble contaminants, the source fish must be from sustainably managed fisheries, and preferably from trimmings that would otherwise be wasted. Under the proposal, contaminants would be removed to the greatest practical extent.

Should sources develop to meet these new rigid specifications, it is expected that they will require substantial additional costs for aquaculture feed and therefore for organic aquatic products. These aquaculture feed standards, if adopted, would provide a substantially different set of requirements for obtaining fish meal and oil.

Healthiness. Amounts of omega-3 fatty acids for fish grown under the proposed standard will be comparable to wild counterparts. The trend in conventional aquaculture is to greatly reduce the unnaturally high levels now fed because until recently fish oil was a more economical source of energy for the fish than meal. The trend is also to substitute non-omega-3 containing oils. Under the proposed standard, fish with omega-3 fatty acids at natural levels would be produced providing consumers with assured healthiness. The proposed standards also prevent the use of unnaturally high levels of fish oil as a low cost energy source in aquatic feeds.

Antibiotics and other medications. The use of antibiotics and synthetic medications, other than through listing on the National List, is proscribed. Antibiotics and other objectionable substances are occasionally discovered in aquatic animals from foreign sources where laws and enforcement are not stringent. Most aquaculture products are imported into the United States. In the case of earthen ponds, a conversion period on one-year under organic production is required after medication.

Aquaculture products grown under the proposed standards would be free of such substances providing consumers an assurance that is not available with aquatic animals from conventional production.

Discharges to the Environment. Throughout the proposed standards there are requirements to manage nutrients, reduce discharges, and a requirement, where possible, to integrate other aquatic products to utilize metabolites of the aquatic animals in production that would otherwise enter the wider environment. Such recycling of nutrients is seldom a practice in conventional aquaculture, and materially differentiates aquatic animals produced under this proposed standard. For example, an integrated net pen operation under the proposed standards can easily be differentiated from conventional.

Origin of aquatic animals. Some conventional practices are proscribed, such as the use of hormones to produce monosex stocks. Triploid production is prohibited as are genetically modified plants and animals. Use of prohibited substances are proscribed. These provisions substantially differentiate proposed organic aquaculture from conventional for many aquatic animals.

Predator control. Each aquaculture facility, under the proposed standard, must develop an integrated and proactive predator deterrence plan with a wide range of considerations. This greatly exceeds minimum requirements under local and federal laws and substantially differentiates aquaculture production.

Humane slaughter. In conventional aquaculture, a wide variety of slaughter methods are employed. These proposed standards require that finfish be killed in a manner that renders them instantly insentient before or immediately after they are taken from the water. Most conventional slaughter practices employed in the United States are prohibited and substantially improved methods are required.

Each of these areas of differentiation from either wild or conventional aquaculture production follow organic principles developed for terrestrial agriculture to provide consumers with confidence that the aquatic animals produced under these proposed standards provide them with:

* heightened protection for the environment through sustainable sourcing of fish meal and oil and the recovery of metabolites through integration;
* maximum healthiness with reduced contamination, assured natural levels of omega-3 fatty acids, absence of antibiotic residues, freedom from hormones for animals reproduced without triploid intervention;
* increased wildlife protection through increased discharge standards and predator controls; and
* substantially improved humane slaughter.

Fish raised under the proposed standards would be healthy, nutritious and wholesome. Highest possible levels of respect for the environment would be observed including for wildlife. Animal welfare during growth and slaughter are major considerations. These areas of differentiation that consumers seek in organic production will add considerable costs relative to conventional production.

Organic aquaculture under the proposed standards in the Interim Final Report provides advantages relative to conventional aquaculture including:

* Recycling of nutrient inputs, where feasible.
* More efficient use of feed inputs.
* Reduced use of marine protein and lipids.
* Use of organic certified feed ingredients other than fish meal and oil.
* Increased protection against escapes.
* No medications contained in discharge water.
* Disposal of discharge water under highly controlled conditions.
* Reduction of disease factors.
* Increased wildlife protection through rigorous discharge standards and predator controls.

Use of Fish Meal and Fish Oil

Will the organic consumer find the temporary 12% fish oil and fish meal allowances acceptable and what will consumer reaction be if (in a worst case scenario) certain aquaculture products no longer qualify as organic after the seven year fish oil and fish meal allowance period expires?

Will it be possible for other feed ingredients or organic sources of fish oil and fish meal to be developed within this time frame to replace fish oil and fish meal from sustainable capture fisheries?

AWG believes that the answer to the first question is best answered by organic consumers. With regards to the second question, it is the best professional judgment of the aquaculture nutritionists on the Aquaculture Working Group that continuing advancements in technology will allow organic feed ingredients to develop to replace marine fish meal and oil within the suggested timeframe, although uncertainty remains.

Sources of Fish Meal and Fish Oil

The Livestock Committee invites suggestions for appropriate criteria for sources of fish meal and fish oil and methods to verify that sources meet such criteria.

Within AWG, with AWG and the NOSB Livestock Committee, and in public comments, considerable discussion has occurred relative to aquaculture feed standards, particularly relative to sourcing fish used to produce fish meal and oil. As a result, the following is under consideration:

(1) Fishmeal or oil should not be sourced from any reduction fishery classified by relevant state/provincial, national or international fisheries authorities as follows: 'at risk of reduced reproductive capacity'; 'suffering reduced reproductive capacity'; 'harvested outside precautionary limits'; 'overexploited'; 'depleted'; 'overfished'; 'overfishing is occurring' (or any other comparable classification).

(2) Use of fish meal and fish oil derived from wild sources that are in compliance with (1) may be used as supplements under one of the following:

(a) Wild fish and other wild seafood, provided that the amount of such wild fish and wild seafood that goes into feeding the aquatic animals cannot exceed one pound of wild fish product fed for every pound live weight of cultured of aquatic animals at harvest.

(b) Carcasses, viscera, and trimmings from the processing of wild fish and other wild seafood that are destined for human consumption. The portions of processed wild fish destined for human consumption may not be certified or labeled as organic unless provide elsewhere in this rule.

(3) Aquaculture feeds may include fish meal and oil derived from organically raised aquatic animals or algae without limitation according to an organic system plan, providing the meal and oil is produced from fish of a different genus than the aquatic animal being fed.

(4) Silage and lipids produced from organic fish that is enzyme-processed, or produced with acids and bases that are organically certified or approved in § 205.605 for fish emulsion or other purposes, may be certified organic and incorporated into organic aquaculture feeds without limitation.

(5) Organic aquaculture feeds may include meals and oils containing essential fatty acids produced by processes allowed in organic production.

(6) For fish meal and fish oil from wild fish used in organic feeds, levels of unavoidable residual environmental contaminants, including persistent bioaccumulative toxins (PBTs) and mercury, cadmium, lead, arsenic and tin must be less than or equal to the lowest levels found in commercially available fish meal and fish oil, provided, however, that the comparable products are classes of fish meal and oil allowed in this section, and do not include those pro-

duced with volatile organic solvents not allowed under § 205.603. Fish oil must be treated with activated carbon, including synthetic activated carbon, or any process using water as a solvent, for removal of contaminants.

(7) Nutritional pigmenting compounds that have been produced and handled in accordance with organic requirements and allowed by the U.S. Food and Drug Administration for inclusion in aquaculture feeds may be used.

The Aquaculture Working Group welcomes suggestions for alternative criteria.

Slaughter Byproducts in Aquaculture Feed

Should by-products from processing of terrestrial organic livestock, now prohibited in feeds for organic terrestrial mammals and poultry, be allowed as ingredients in organic aquaculture feeds?

The Interim Final Report of the Aquaculture Working Group acknowledged the merits and problems involved with the use of animal byproducts in aquaculture feed, and recommended against their use. Our comments are copied below.

"The Aquaculture Working Group spent considerable effort addressing the question of whether to provide for the inclusion in organic aquaculture feeds by-products from the processing of terrestrial livestock. While the Group was mindful that § 205.237 *Livestock Feeds* of the Final Rule states: "(b) The producer of an organic operation must not: (5) Feed mammalian or poultry slaughter by-products to mammals or poultry" there was considerable discussion about using mammalian and avian meals as organic feed ingredients. Slaughter by-products can be a source of essential dietary nutrients in aquaculture provided they are produced from organically raised healthy animals and under veterinary supervision following existing processing methods approved by the USDA and other government authorities.

"It may be possible to formulate effective diets for carnivorous finfish species (such as salmonids and other marine finfish species) with low amounts of fish meal and fish oil by using alternative dietary protein sources, including plant protein ingredients plus vertebrate and invertebrate animal by-products meals to provide essential amino acids.

"The Working Group agreed that there is no compelling scientific rationale to prohibit byproducts from organic terrestrial animals in feeds for organic aquatic animals. The transmission of prion diseases from by-products of warm blooded, terrestrial animals to very distantly related cold-blooded aquatic animals is highly improbable.

"However, there are tradeoffs in allowing or disallowing the use of terrestrial animal processing by-products. Without the use of terrestrial animal byproduct meals, and with restrictions on the use of fish meal in aquatic animal diets, it may be necessary to include synthetic amino acids on the National List to allow formulation of nutritionally complete diets and achieve organic certification for some carnivorous animals. The use of organically certified terrestrial animal processing by-products would eliminate the need for synthetic amino acids and would reduce the amount of fish meal supplements necessary for good aquatic animal growth and health. Moreover, use of by-products of terrestrial animal processing would encourage waste reduction and nutrient recycling, thus supporting important organic principles.

"On the other hand, the inclusion of by-products of terrestrial animal processing is prohibited in organic livestock feeds. Many consumers prefer that these by-products not be used in animal production and some grocery brands and food retailers prohibit their use. In addition, some people who consider themselves vegetarians nonetheless eat finfish and crustaceans. Allowing terrestrial animal by-products in aquatic animal feed might lead these individuals to find organic fish products unacceptable.

"The aquaculture working group proposes these draft standards with a prohibition on the use of by-products of terrestrial animal processing in feed as is the case with livestock. However, we ask that the NOSB and other commenters on the draft standards consider the tradeoffs involved."

Aquaculture Working Group
Aquatic Animal Task Force
October 3, 2006